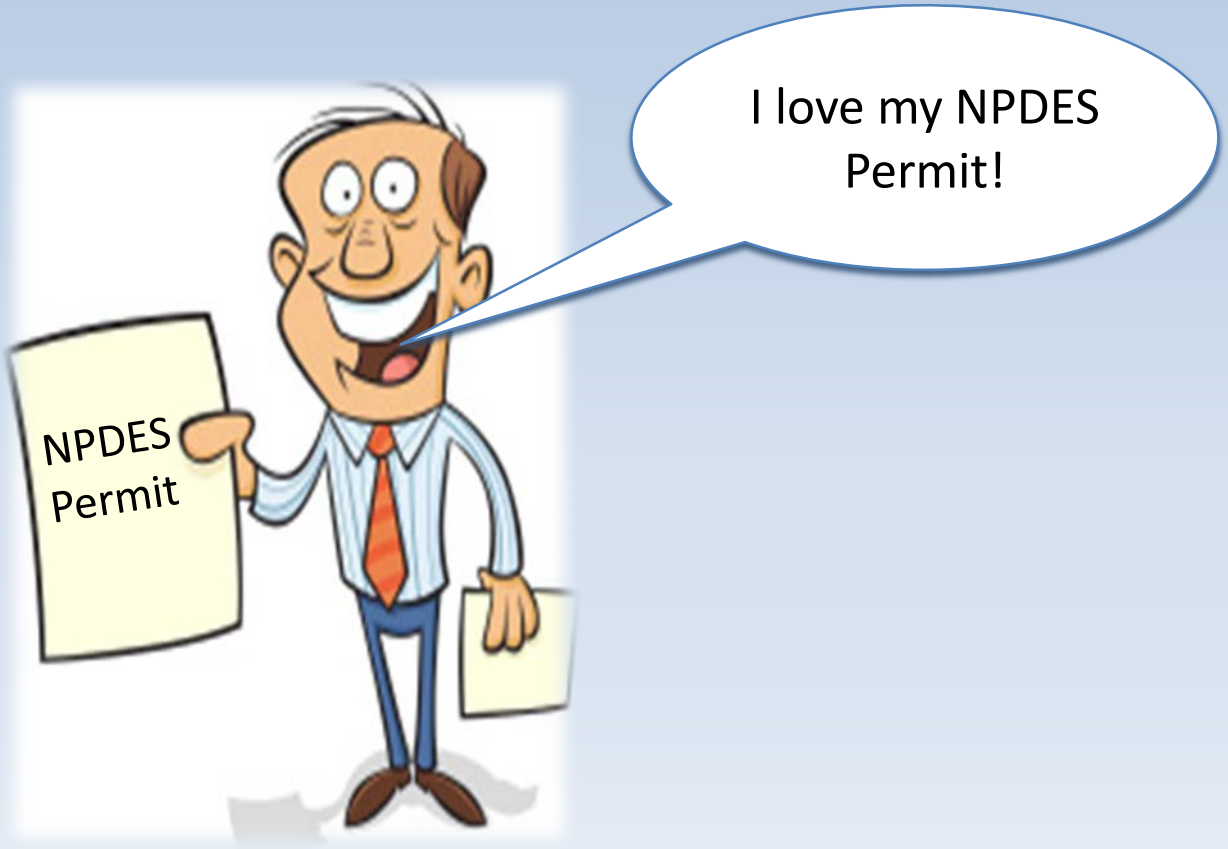
NPDES Permitting Process



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NPDES Permit

- **National Pollutant Discharge Elimination System**
- **Who needs one**
  - Anyone who discharges wastewater to “waters of the state”

Different Types of Regulated Wastewaters

- Sanitary Sewage
- Stormwater
- Non-contact cooling water
- Industrial process wastewater

OAC 3745-01-02: “waters of the state”

All streams, lakes, reservoirs, ponds, marshes, wetlands, or other waterways situated wholly or partially within the boundaries of the state except private water not connected to natural surface of ground waters.

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Different Types of NPDES Permits

- **Indirect NPDES Permits (Pretreatment)**
  - Permits to discharge to a local POTW
- **General Permits**
  - The easiest of the NPDES permits available from the state, with the one size fits all, usually a short form, email to Columbus with the appropriate fee
- **Individual NPDES Permit**
  - Written specifically for your company
  - Focus of this presentation

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NPDES Regulation Trigger

These all require that you first submit an application to the Agency…

- **Discharging of treatment works discharging to "Waters of the State"**
- **Installing new treatment works**
- **Expanding treatment works or needing to modify**
- **Expiring existing NPDES Permits**
- **Significantly changing the characteristics of your permitted discharge**

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WLA - Wasteload allocation, the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution

PEQ - Projected effluent quality, estimated level of a pollutant in an effluent

RP - Reasonable potential, the likelihood of a pollutant to cause or contribute to an excursion of a water quality standard

PEL - Preliminary effluent limit, the most stringent applicable WLA expressed as both an average and a maximum

WQBEL - Water quality based effluent limit, an effluent limitation determined on the basis of water quality standards set forth in Chapter 3745-1

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It's all about pie!

WLA = 

A permit allocates a "slice" of pie to a facility by way of a discharge permit.

Rules governing how to slice up the pie are located on OAC 3745-2.

WQBEL = 

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Process is data driven.

Application No. OH0024741

Issue Date: June 30, 2010

Effective Date: August 1, 2010

Expiration Date: July 31, 2015

Ohio Environmental Protection Agency
Authorization to Discharge Under the
National Pollutant Discharge Elimination System

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq., hereinafter referred to as the "Act"), and the Ohio Water Pollution Control Act (Ohio Revised Code Section 6111),

City of Columbus, Ohio

is authorized by the Ohio Environmental Protection Agency, hereinafter referred to as "Ohio EPA," to discharge from the Southerly Wastewater Treatment Plant wastewater

Monthly Operating Report (MOR) Statistics for: Columbus Southerly WWTP; 4PF00001

Season	Year	# of Obs.	# Below Detection	Minimum	Percentiles 5th	25th	50th	75th	95th	99th
Monitoring Station 001;		Reporting Code:		00300;		Parameter Name:		Dissolved Oxygen (mg/l)		
Summer	2011	122	0	8.2	8.505	9	9.1	9.3	9.5	9.7
Summer	2012	120	0	8.2	8.895	9.1	9.2	9.3	9.5	9.581
Summer	2013	122	0	7.6	8.3	8.6	8.7	8.9	9.195	9.279
Summer	2014	122	0	7.6	8.2		8.9	9	9.2	9.637
Summer Overall	2011-2015	486	0	7.6	8.4		9	9.2	9.4	9.7
Winter	2011	59	0	8			10.8	10.9	11.21	11.3
Winter	2012	91	0	8.7			10.7	10.9	11.15	11.25
Winter	2013	90	0			.725	10.2	10.5	10.755	10.911
Winter	2014	90	0			9	9.4	10.1	10.955	11.6
Winter	2015	90			8.8	9.025	9.4	9.7	10	10.022
Winter Overall	2011-2015	420			8.8	9.4	10.05	10.7	11.005	11.3
Annual	2011			0.1	8.7	9.2	9.7	10.4	11	11.2
Annual	2012			8.2	9	9.2	9.7	10.425	10.985	11.137
Annual	2013		0	5.1	8.4	8.7	9.2	10.2	10.9	11.1
Annual	2014		0	7.6	8.42	8.8	9	9.7	11	11.972
Annual	2015	120	0	8.4	8.995	9.4	9.6	9.9	10.205	10.481
Annual Overall	2011-2015	1579	0	0.1	8.5	9	9.4	10.2	10.9	11.3

Discharger Reports

OhioEPA Division of Environmental Services

Laboratory Inorganic Analysis Data Report

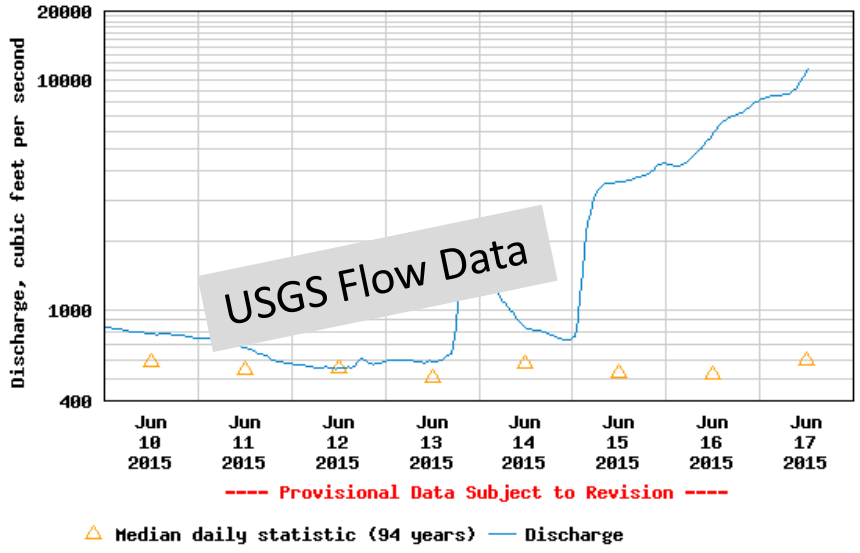
Sample 174314
Date Received 04/21/2015 1:07 PM **Matrix** SW **Collected by** LEWIS, JEFFREY
Begin **End** **Sample Type** AMBIENT
Date Collected 04/21/2015 10:45 AM **Station ID** 601300
Program CDO-DSW **Customer ID** 15JWL0421
Client DSW **External ID** 133320
OEPA Division DSW **County** PICKAWAY
Location 2 - BIG DARBY CK @ SR 316 AT DARBYVILLE

Analysis	Parameter	Storet	Result	Value	DF	RL	MDL	Units	Date	Qualifier
Solids_Diss	Total Dissolved Solids		416	416	1	10	3	mg/L	04/22/15	
Solids_Susp	Total Suspended Soli			64	1	5	1	mg/L	04/22/15	
ICPMS_(WAT)	Arsenic			1.5	1	2	0.1	ug/L	05/22/15	U+
ICPMS_(WAT)	Cadmium				1	0.2	0.02	ug/L	05/22/15	U+
ICPMS_(WAT)	Chromium	P1034				2	0.1	ug/L	05/22/15	U+
ICPMS_(WAT)	Copper	P1042	2.4				0.2	ug/L	05/22/15	
ICPMS_(WAT)	Lead	P1051	<2.0				0.1	ug/L	05/22/15	U+
ICPMS_(WAT)	Nickel	P1067	3.7	3.7				ug/L	05/22/15	
ICPMS_(WAT)	Selenium	P1147	<2.0	0.7	1			ug/L	05/22/15	U+
ICP_(WAT)	Aluminum	P1105	1140	1140	1	200		ug/L	05/14/15	
ICP_(WAT)	Barium	P1007	94	94	1	15	3	ug/L	05/14/15	

Ohio EPA Stream Data

USGS

USGS 03227500 Scioto River at Columbus OH



USGS Flow Data

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PEQ - Projected effluent quality, estimated level of a pollutant in an effluent

If Method A is applied, the maximum PEQ and the average PEQ are determined using the following equations:

Maximum PEQ = (maximum daily concentration) * F
Average PEQ = Maximum PEQ * 0.73

If Method B is applied, the maximum PEQ is determined as the upper bound of the 90% confidence interval about the 95th percentile of the projected distribution of the daily effluent data, and the average PEQ is determined as the upper bound of the 90% confidence interval about the 95th percentile of the projected distribution of the monthly averages of the effluent data. The following equations and statistics are used to calculate the maximum and average PEQ:

Maximum PEQ	=	exp(LM + k * LS)
Average PEQ for m<10	=	exp(LMA + k * LSA)
Average PEQ for m≥10	=	EX + k * sqrt(VX / m)

m	=	Number of effluent observations per month, minimum of 4,
n	=	Total number of effluent observations,
LM	=	Mean of the natural logs of the daily effluent data,
LS	=	Standard deviation of the natural logs of the daily effluent data,
LMA	=	ln(EX) - 0.5 * LSA^2 = Estimated mean of the natural logs of the monthly averages of the effluent data[5],
LSA	=	sqrt{ ln[VX / (m * EX^2) + 1] } = Estimated standard deviation of the natural logs of the monthly averages of the effluent data[5],
EX	=	exp(LM + 0.5 * LS^2) = Estimated long-term mean of the daily effluent data[5],
VX	=	exp(2*LM + LS^2) * (exp[LS^2] - 1) = Estimated long-term variance of the daily effluent data[5],
exp()	=	Base e (or approximately 2.71828) raised to the power of the quantity shown within the parentheses,
ln()	=	Natural log of the quantity shown within the parentheses,
sqrt()	=	Square root of the quantity shown within the parentheses,
k	=	TINV(p,df,nc) / sqrt(n) = Factor representing the position in the standard normal curve of the upper 90% confidence interval about the 95th percentile for a data set with n observations. Derived from section 11.2 of Odeh & Owen[2]. The factor can also be determined using Table 1 of Odeh & Owen[2] (for "P"=0.95 and "GAMMA"=0.90), or Table A.12d of Hahn & Meeker[3] (for "p"=0.95 and "1-α"=0.90.)
TINV()	=	Inverse noncentral t-distribution function,
p	=	0.90 = numeric probability of upper confidence level,
df	=	n - 1 = degrees of freedom,

You can do it this way, by hand, or….

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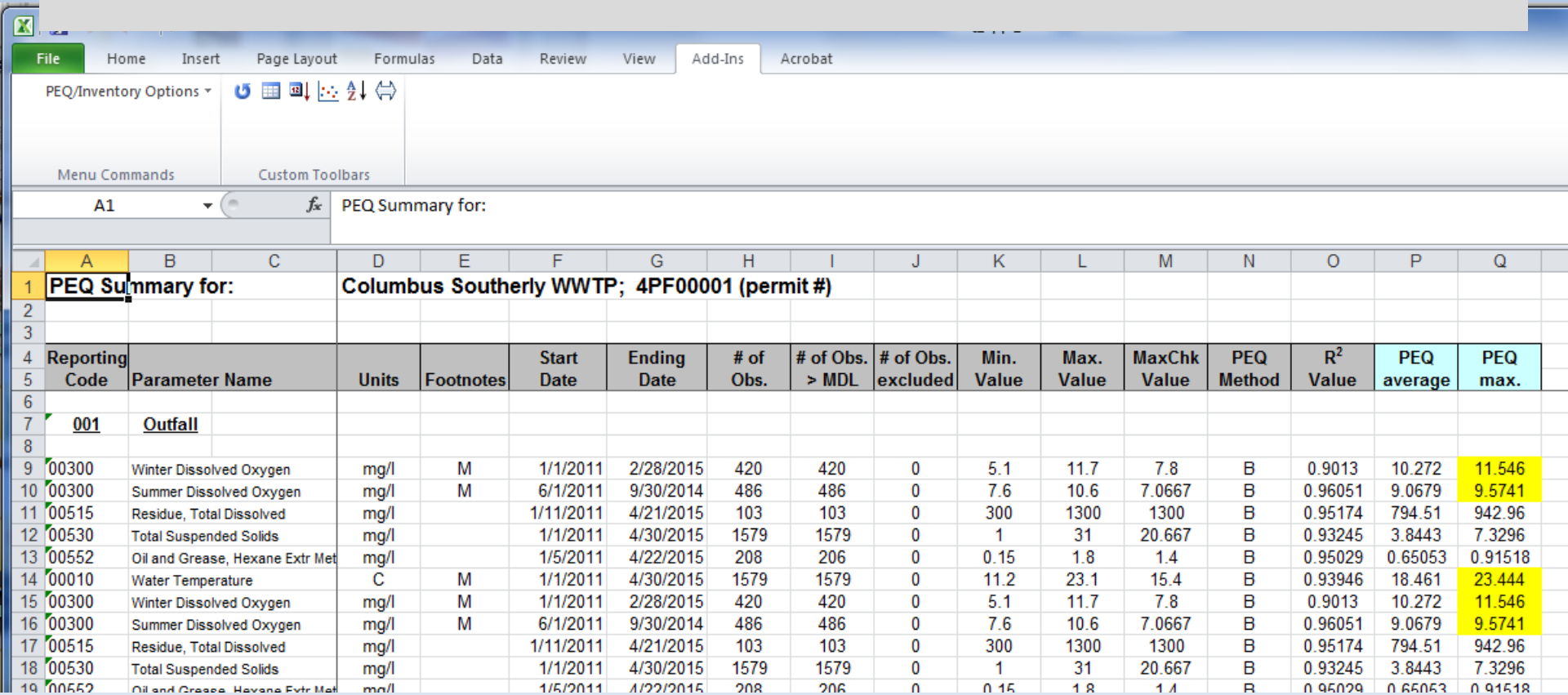
or….do a little typing and click on the mouse!



File Home Insert Page Layout Formulas Data Review View Add-Ins Acrobat

PEQ/Inventory Options

Menu Commands Custom Toolbars

A1 PEQ Summary for:

PEQ Summary for: Columbus Southerly WWTP; 4PF00001 (permit #)

Reporting Code	Parameter Name	Units	Footnotes	Start Date	Ending Date	# of Obs.	# of Obs. > MDL	# of Obs. excluded	Min. Value	Max. Value	MaxChk Value	PEQ Method	R^2 Value	PEQ average	PEQ max.
001	Outfall														
00300	Winter Dissolved Oxygen	mg/l	M	1/1/2011	2/28/2015	420	420	0	5.1	11.7	7.8	B	0.9013	10.272	11.546
00300	Summer Dissolved Oxygen	mg/l	M	6/1/2011	9/30/2014	486	486	0	7.6	10.6	7.0667	B	0.96051	9.0679	9.5741
00515	Residue, Total Dissolved	mg/l		1/11/2011	4/21/2015	103	103	0	300	1300	1300	B	0.95174	794.51	942.96
00530	Total Suspended Solids	mg/l		1/1/2011	4/30/2015	1579	1579	0	1	31	20.667	B	0.93245	3.8443	7.3296
00552	Oil and Grease, Hexane Extr Met	mg/l		1/5/2011	4/22/2015	208	206	0	0.15	1.8	1.4	B	0.95029	0.65053	0.91518
00010	Water Temperature	C	M	1/1/2011	4/30/2015	1579	1579	0	11.2	23.1	15.4	B	0.93946	18.461	23.444
00300	Winter Dissolved Oxygen	mg/l	M	1/1/2011	2/28/2015	420	420	0	5.1	11.7	7.8	B	0.9013	10.272	11.546
00300	Summer Dissolved Oxygen	mg/l	M	6/1/2011	9/30/2014	486	486	0	7.6	10.6	7.0667	B	0.96051	9.0679	9.5741
00515	Residue, Total Dissolved	mg/l		1/11/2011	4/21/2015	103	103	0	300	1300	1300	B	0.95174	794.51	942.96
00530	Total Suspended Solids	mg/l		1/1/2011	4/30/2015	1579	1579	0	1	31	20.667	B	0.93245	3.8443	7.3296
00552	Oil and Grease, Hexane Extr Met	mg/l		1/5/2011	4/22/2015	208	206	0	0.15	1.8	1.4	B	0.95029	0.65053	0.91518

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A PEL a day……

PEL - Preliminary effluent limit, the most stringent applicable WLA expressed as both an average and a maximum

An example using Arsenic

WQS for Arsenic

150 µg/l Average ⇄ **PELs**

340 µg/l Maximum

Maximum PEQ =	(maximum daily concentration) * F
Average PEQ =	Maximum PEQ * 0.73

F=2.3 for n=5

Effluent Results Scenario 1	Effluent Results Scenario 2
34 µg/l	430 µg/l
23	563
12	421
14	390
23	290

	Scenario 1	Scenario 2
Max PEQ =	34*2.3 = **78.2**	563*2.3 = **1294.9**
Ave PEQ =	78.2*0.73 = **57.08**	1294.9*0.73 = **945.2**

Congratulations! We have just calculated the size of your slice of the pie you currently have.

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Flow

WQS for Arsenic
150 µg/l Average
340 µg/l Maximum

Magnitude and frequency of low flow for indicated periods

Period	Number of consecutive days	Streamflow (ft^3/s) for indicated recurrence interval (years)				
		2	5	10	20	50
Apr.-Mar.	1	8.9	4.9	3.4	2.4	1.5
	7	11	7.8	6.6	5.8	4.9
	30	14	9.9	8.4	7.4	6.4
	90	20	13	11	9.7	8.3
May-Nov.	1	8.9	4.9	3.4	2.4	1.5
	7	11	7.9	6.8	6.0	5.2
	30	14	9.9	8.4	7.4	6.4
	90	20	13	11	9.7	8.4
Dec.-Feb.	1	30	18	12	8.7	5.5
	7	33	21	16	12	8.8
	30	55	31	23	19	14
	90	165	99	71	52	35
Sep.-Nov.	1	9.6	5.7	4.3	3.3	2.5
	7	11	8.1	7.1	6.4	5.9
	30	17	11	9.0	8.1	7.3
	90	41	21	15	12	8.9

Loading = Flow * Concentration * 3.79

4.2 mgd*0.150 mg/l*3.79 = **2.387 kg/d Average Load**

2.19 mgd*0.340 mg/l*3.79 = **2.82 kg/d Maximum Load**

(1) The following stream design flows shall be used to determine WLAs for discharges to flowing receiving waters, unless otherwise specified in this rule.

(a) 7Q10 for average aquatic life criteria (except for ammonia-nitrogen).

(b) 1Q10 for maximum aquatic life criteria (except for ammonia-nitrogen).

(c) HMQ for agricultural water supply, human health, and aesthetic criteria.

(d) 90Q10 for wildlife criteria.

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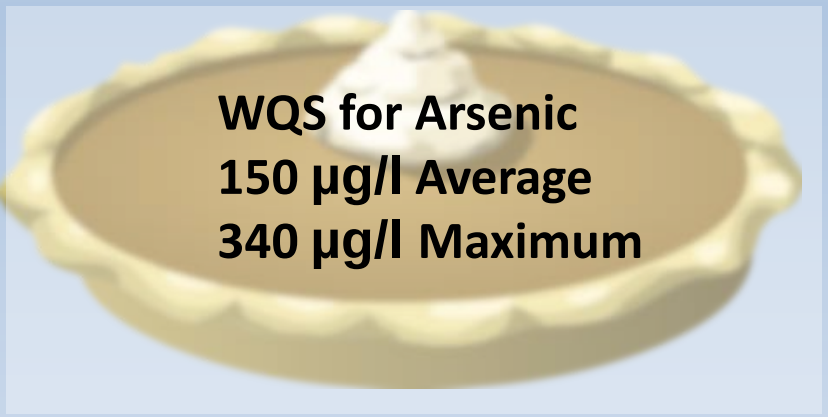
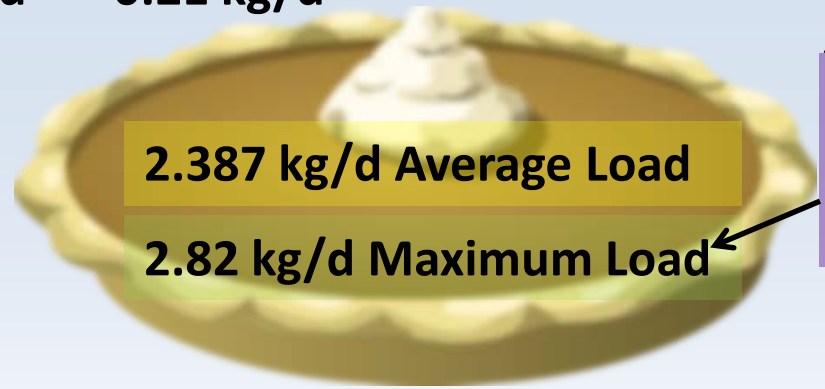
Figure out the whole pie!

RP - Reasonable potential, the likelihood of a pollutant to cause or contribute to an excursion of a water quality standard



Let's say the plant discharges 1 mgd

	Scenario 1	Scenario 2
Max PEQ =	**78.2 µg/l**	**1294.9 µg/l**
Ave PEQ =	**57.08 µg/l**	**945.2 µg/l**
Max Load=	**0.29 kg/d**	**4.9 kg/d**
Average Load=	**0.21 kg/d**	**3.58 kg/d**



RP – Under Scenario 2 both the Average and Maximum loads exceed the PEL.

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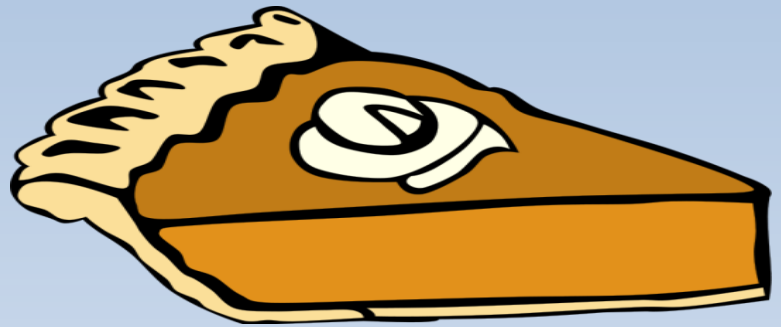
$$\frac{WQC\,(Q_{eff} + Q_{up}) - Q_{up}\,(WQ_{up})}{Q_{eff}}$$

WLA - Wasteload allocation, the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution



Max Load= **4.9 kg/d**
Average Load= **3.58 kg/d**

Your slice of pie is too big! Time for a diet.

WLA for Arsenic Average WQS (mg/l)

$$\frac{0.150 * (1.547 + 6.6) - 6.6(0.005)}{1.547} = 0.769$$

WLA for Arsenic Maximum (mg/l)

$$\frac{0.340 * (1.547 + 3.4) - 3.4(0.005)}{1.547} = 1.076$$

Translation:

(A) For each discharge that may require the development of water quality-based effluent limitations (WQBELs), Ohio EPA shall develop wasteload allocations (WLAs) for pollutants if:

(1) The maximum projected effluent quality (PEQ) determined for that discharge and pollutant is greater than or equal to twenty-five per cent of the smallest of the applicable maximum criteria, where the maximum PEQ is determined in accordance with paragraph (D) of this rule and the criteria are determined in accordance with paragraph (E) of this rule; or

(2) The average PEQ determined for that discharge and pollutant is greater than or equal to twenty-five per cent of the smallest of the applicable average criteria, where the average PEQ is determined in accordance with paragraph (D) of this rule and the criteria are determined in accordance with paragraph (E) of this rule; or

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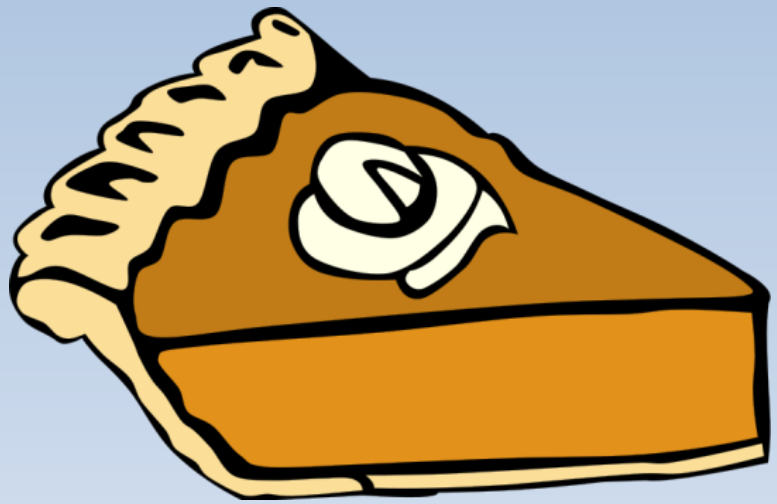
Your wasteload concentrations are:

Average = 769 µg/l
Maximum = 1076 µg/l



But wait…there is more!

The Agricultural standard for average concentrations is 100 µg/l
The Inside Mixing Zone standard is 680 µg/l

Both are more restrictive than the WLA and become your new limits

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Waste Load Allocation Model: Main Data Entry Screen (v3.4)

Instructions | Print Page

Today's Date:	6/18/2015		Note: Inputs allowed only in the turquoise shaded cells	
Revision History:				Outfall: 001
Entity Name:	Company X			River Mile:
Permit No:				
Receiving Stream/Water Body:	Stream			Writer:
				Reviewer:
				Receiving water type:
Use Designations:	Aquatic Life Use	WWH		stream
	Water Supply	AWS, IWS		
	Recreation			Discharge within 500 yards of pu water supply intake:
	Special			no
Basin:	Ohio River Basin		Select Parameters	

	Units	Season	Value	Source	Percent of Stream to use in WLA
Upstream Flows					
7Q10	cfs	summer			100
		winter			100
		annual	6.6		100
1Q10	cfs	annual	3.4		100
30Q10	cfs	summer			100
		winter			100
90Q10	cfs	annual			100
Harmonic Mean Flow	cfs	annual			100
Mixing Assumption	%	average	100		
		maximum	100		
Downstream WQ:					
Temperature (75th percentile	degrees C.	summer			
		winter			
pH (75th percentile)	standard units	summer			
		winter			
Hardness	mg/l	outside mixing zone			
	mg/l	inside mixing zone			
Effluent Design Flow (cfs)	1.547	(in MGD):	1		
Alternative Dilution Factors					
for Inside Mixing Zone Criteria (IMZM)			1		
for Outside Mixing Zone Maximum Criteria (OMZM)			1		
for Average Criteria			1		

Stream/Discharge Flow Ratio: 4.266321913

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Water Quality Criteria

Company X

Note: Under the 'Footnotes' column, "c" means carcinogen, "BCC" means bioaccumulative chemical of concern.

Parameter	Units	Average: Wildlife	Average: Human Health	Average: Agricultural Supply	Average: Aquatic Life	Maximum: IMZM	Maximum: Max. AQ Life	Footnotes
Arsenic - TR	ug/l	--	580	100	150	680	340	

Calculating PEQs (Projected Effluent Quality)

Company X

Note: Cells shaded turquoise require data entry.

*** Under NO circumstances should you insert rows. Deletions should be made using the toolbar option. ***

Parameter	Units	Number of Observations	# > MDL	Method of Calculation (enter A or B)	Maximum Value	F Value	PEQ Average	PEQ Maximum
Arsenic - TR	ug/l	5	5	A	563	2.3	945.277	1294.9

Sheets and more sheets

Print Tables

Instructions

Reasonable Potential - Part I: Company X

*** Under NO circumstances should you insert rows. Deletions should be made using the toolbar

Parameter	Units	Average: Wildlife	Average: Human Health	Average: Agricultural Supply	Average: Aquatic Life	PELavg	PEQavg	%	Group	IMZM	Maximum: Max. AQ Life	PELmax	PEQmax	%	Group
Arsenic - TR	ug/l	--	580	100	150	100	945.277	945.28	W	680	340	340	1294.9	380.85	W
Ammonia-S	mg/l	--	--	--	1.9	1.9	0	--	1	--	--	--	0	--	1
Ammonia-W	mg/l	--	--	--	5.6	5.6	0	--	1	--	--	--	0	--	1

Table 7. Summary of Effluent Limits to Maintain Applicable WQ Criteria

Parameter	Units	Outside Mixing Zone Criteria: Average: Human Health	Average: Agri-culture	Average: Aquatic Life	Maximum Aquatic Life	Inside Mixing Zone Maximum
Arsenic - TR	ug/l	580	100	769	1076	680

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Factsheet Tables

Assign Parameter Groupings

Table 8. Parameter Assessment

Group 1: Due to a lack of criteria, the following parameters could not be evaluated at this time.

Group 2: PEQ < 25 percent of WQS or all data below minimum detection limit. WLA not required. No limit recommended; monitoring optional.

Group 3: PEQ_{max} < 50 percent of maximum PEL and PEQ_{avg} < 50 percent of average PEL. No limit recommended; monitoring optional.

Group 4: PEQ_{max} >= 50 percent, but < 100 percent of the maximum PEL or PEQ_{avg} >= 50 percent, but < 100 percent of the average PEL. Monitoring is appropriate.

Group 5: Maximum PEQ >= 100 percent of the maximum PEL or average PEQ >= 100 percent of the average PEL, or either the average or maximum PEQ is between 75 and 100 percent of the PEL and certain conditions that increase the risk to the environment are present. Limit recommended.

Limits to Protect Numeric Water Quality Criteria

Parameter	Units	Period	Recommended Effluent Limits Average	Maximum
Arsenic - TR	ug/l		100	680

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WQBEL - Water quality based effluent limit, an effluent limitation determined on the basis of water quality standards set forth in Chapter 3745-1

Arsenic

Average limit in permit = 100 µg/l

Maximum limit in permit = 680 µg/l

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Knowing all of this, it is Important to Review NPDES Permits and Understand the Information used to Create the Permit

The Importance of Reviewing Your Draft Permit

Or …

Would You Sign a Contract Without Reading it First

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1. It is important to review the permit during the 30-day draft period.

2. Understand the concepts that were used to develop the permit.

3. Get together with the permit writer at Ohio EPA within the 30-day review period to discuss the permit if you have questions.

4. If you need more time than the thirty days, let Ohio EPA know.

District Offices

Central District	(614) 728-3778
Northeast District	(330) 963-1200
Southeast District	(740) 385-8501
Southwest District	(937) 285-6357
Northwest District	(419) 352-8461

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Questions?

Ohio Environmental Protection Agency

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Thank you!

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